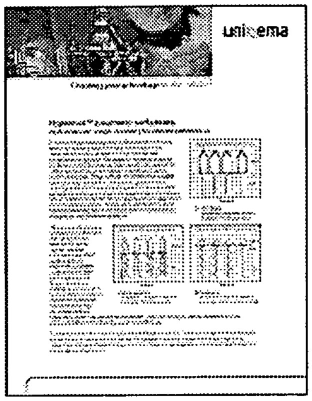
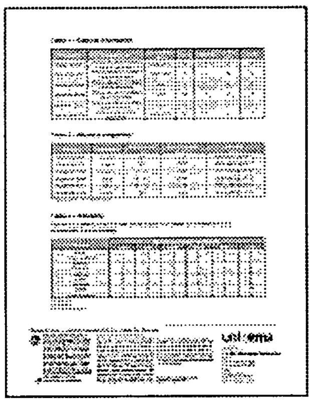
Hypermer™ polymeric surfactants
High molecular weight chemistry for ultimate performance





Uniqema's Hypermer polymeric surfactants are molecules featuring repeating hydrophilic and hydrophobic units, designed to produce emulsions of high stability and controllable droplet size. The range of Hypermer products contained in this literature has been specifically selected for oilfield applications, where highest emulsification performance is required. Responding to the diverse technologies used in drilling, completion, stimulation, production and cleaning applications, Uniqema's Hypermer range of oilfield surfactants combine a number of innovative base chemistries and emulsification mechanisms to readily produce water-in-oil or oil-in-water emulsions. All use steric stabilization to form thermodynamically stable emulsions controlling flocculation, coagulation and coalescence effects.

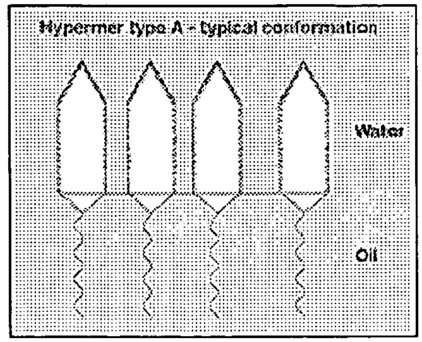


Figure 1

A - PEG Alkyds
Hydrophobe: Long-chain alkylene
Hydrophile: Polyethylene glycol

These base chemistries of Hypermer surfactants are highly efficient interfacially active agents, yet they only marginally affect surface tension. Hypermer polymeric surfactants are non-ionic, however, the E type variant can behave as an anionic in suitably basic conditions. Hypermer surfactants are resistant to high ion concentrations, dispersed phase volumes and temperatures, meaning that highly stable emulsions can be produced with minimal foaming, even in paraffinic oils.

Following is a list of Uniqema's polymeric surfactants from the Hypermer range currently available for use in the oil and related industries. The generic chemistry, physical state and regulatory status are indicated. Please consult your local Uniqema representative for product lead times and for additional information.

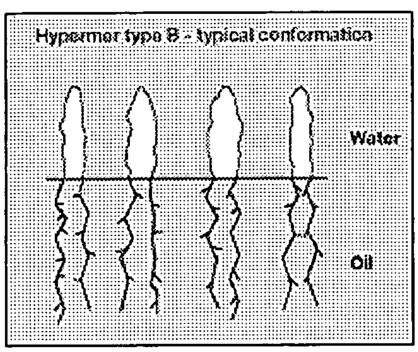


Figure 2

B-Block copolymer
Hydrophobe: Polyhydroxy fatty acid
Hydrophile: Polyethylene glycol

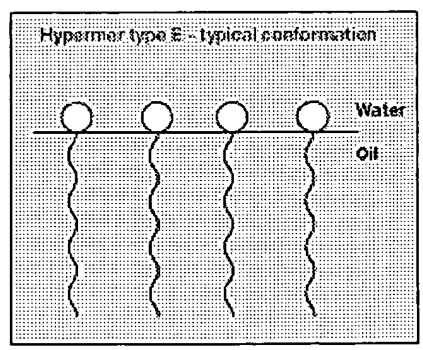


Figure 3

E-Oligomerics
Hydrophobe: Long-chain alkylene
Hydrophile: Anionic/nonionic (various)

```
FILE 'CAPLUS' ENTERED AT 09:09:44 ON 24 APR 2003
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
COPYRIGHT (C) 2003 AMERICAN CHEMICAL SOCIETY (ACS)


Copyright of the articles to which records in this database refer is
held by the publishers listed in the PUBLISHER (PB) field (available
for records published or updated in Chemical Abstracts after December
26, 1996), unless otherwise indicated in the original publications.
The CA Lexicon is the copyrighted intellectual property of the
American Chemical Society and is provided to assist you in searching
databases on STN.  Any dissemination, distribution, copying, or storing
of this information, without the prior written consent of CAS, is
strictly prohibited.

FILE COVERS 1907 - 24 Apr 2003  VOL 138 ISS 17
FILE LAST UPDATED: 23 Apr 2003  (20030423/ED)

  This file contains CAS Registry Numbers for easy and accurate
  substance identification.


=> s hypermer (P) 464
           200 HYPERMER
             1 HYPERMERS
           201 HYPERMER
                 (HYPERMER OR HYPERMERS)
          3959 464
L1           2 HYPERMER (P) 464

=> s l1 and pluronic
          4657 PLURONIC
           269 PLURONICS
          4755 PLURONIC
                 (PLURONIC OR PLURONICS)
L2           1 L1 AND PLURONIC

=> d l2 ti

L2   ANSWER 1 OF 1  CAPLUS  COPYRIGHT 2003 ACS
TI   Stable invert fuel emulsion compositions and method of making


=> d l2 all

L2   ANSWER 1 OF 1  CAPLUS  COPYRIGHT 2003 ACS
AN   1999:784208  CAPLUS
DN   132:13709
TI   Stable invert fuel emulsion compositions and method of making
IN   Coleman, Gerald N.; Endicott, Dennis L.; Jakush, Edward A.; Nikolov, Alex
PA   Caterpillar Inc., USA
SO   PCT Int. Appl., 39 pp.
     CODEN: PIXXD2
DT   Patent
LA   English
IC   ICM  C10L001-32
CC   51-7 (Fossil Fuels, Derivatives, and Related Products)
FAN.CNT 1
     PATENT NO.        KIND  DATE          APPLICATION NO.   DATE
     ---------------   ----  --------      ---------------   --------
```

```
PI   WO 9963024         A1   19991209       WO 1999-US12199  19990601
         W:  AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE,
             DK, EE, ES, FI, GB, GE, GH, GM, HU, ID, IL, IS, JP, KE, KG, KP,
             KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO,
             NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA,
             UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
         RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK,
             ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG,
             CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG
     AU 9942280         A1   19991220       AU 1999-42280    19990601
PRAI US 1998-88060P     P    19980605
     US 1998-88060      P    19980605
     WO 1999-US12199    W    19990601
```


AB   Method for producing high stability aq. fuel emulsions with an oil or fuel continuous phase. The method provides for selectively combining prescribed quantities of diesel fuel, purified water, alc., and an additive package including a primary surfactant, a block copolymer, and a polymeric dispersant. The fuel emulsion is made by blending the diesel fuel and additive package, adding purified water to the fuel/additive mixt., aging the compn., and passing the aged compn. through a high shear mixer. The optimum stability in the oil continuous fuel emulsion is achieved by using a high shear mixing device, such as a Ross X-series Mixer Emulsifier, which results in the final fuel emulsion having a droplet size distribution of .apprx.1 .mu. or less.


```
ST   diesel fuel emulsion
IT   Polymers, uses
     RL: MOA (Modifier or additive use); USES (Uses)
        (block; stable invert fuel emulsion compns. and method of making)
IT   Diesel fuel
     Dispersing agents
     Fuels
     Surfactants
        (stable invert fuel emulsion compns. and method of making)
IT   Fatty acids, uses
     RL: MOA (Modifier or additive use); USES (Uses)
        (stable invert fuel emulsion compns. and method of making)
IT   Gasoline
     RL: PEP (Physical, engineering or chemical process); PROC (Process)
        (stable invert fuel emulsion compns. and method of making)
IT   93-83-4   106392-12-5, Pluronic 17R2   154101-90-3,
     Hypermer E-464
     RL: MOA (Modifier or additive use); USES (Uses)
        (stable invert fuel emulsion compns. and method of making)
RE.CNT  7      THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
```


(1) Bertha Andras; WO 9812285 A 1998 CAPLUS
(2) British Petroleum Co PLC; EP 0301766 A 1989 CAPLUS
(3) Entoleter; WO 7900211 A 1979 CAPLUS
(4) Gunnerman Rudolf, W; WO 9527021 A 1995 CAPLUS
(5) Nalco Fuel Tech; WO 9307238 A 1993 CAPLUS
(6) Peter-Hoblyn Jeremy, D; US 5584894 A 1996 CAPLUS
(7) Scheuermann Ted, W; US 5873916 A 1999 CAPLUS

=> FILE REG

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	9.44	9.65

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION

```
CA SUBSCRIBER PRICE                                     -0.65      -0.65

FILE 'REGISTRY' ENTERED AT 09:11:39 ON 24 APR 2003
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
COPYRIGHT (C) 2003 American Chemical Society (ACS)

Property values tagged with IC are from the ZIC/VINITI data file
provided by InfoChem.

STRUCTURE FILE UPDATES:    23 APR 2003  HIGHEST RN 504385-01-7
DICTIONARY FILE UPDATES:   23 APR 2003  HIGHEST RN 504385-01-7

TSCA INFORMATION NOW CURRENT THROUGH JANUARY 6, 2003

  Please note that search-term pricing does apply when
  conducting SmartSELECT searches.

Crossover limits have been increased.  See HELP CROSSOVER for details.

Experimental and calculated property data are now available.  See HELP
PROPERTIES for more information.  See STNote 27, Searching Properties
in the CAS Registry File, for complete details:
http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf

=> STR 154101-90-3

154101-90-3 MAY NOT BE USED AS A MODEL
Structures which were created via the STRUCTURE command or are in the
Fragment File may be used as models in the STRUCTURE command.  Most,
but not all, substance Accession Numbers can also be used.
ENTER NAME OF STRUCTURE TO BE RECALLED (NONE):END


=>
THIS FEATURE IS NOT AVAILABLE FOR THE SELECTED CAS RN

=> s 154101-90-3/rn
L3             1 154101-90-3/RN
```

The ethyl alcohol combusts and the carbamic acid produced insitu decomposes readily to ammonia and carbon dioxide. The ammonia reduces the oxides of nitrogen. The ethyl carbamate is a component of the microemulsion fuel. The key to this concept is that the ammonia is produced in the later stages of the combustion which is desirable.

(c) Use a combination of (a) and (b).

3. The concept that the sulfur in petroleum products such as diesel oil and fuel oil oxidize to sulfur oxides like sulfur dioxide in the combustion chamber and the sulfur oxides combine with steam in the exhaust gases to produce sulfur acids such as sulfurous acid which pollutes the air. Further to this concept is that the combination of oxides of nitrogen and the sulfur acids result in acid rain which is detrimental to vegetation.

The idea created is to stoichiometrically neutralize the sulfur acids generated in the combustion chamber by adding an alkaline substance like sodium bicarbonate or sodium carbonate to the microemulsion fuel.

The above objectives of this invention and the above concepts and ideas to achieve these objectives are embodied in the new and novel microemulsion fuel compositions by weight which are summarized as follows:

(a) Diesel oil or fuel oil comprising about 50 to 90% of the microemulsion fuel.

(b) An anionic surfactant prepared from the partial neutralization of 60 to 70 mole percent of the unsaturated fatty acids with ammonia such that there results both free fatty acids and the ammonium salts of the fatty acids. The ammonium salts of the fatty acids which represent the anionic surfactant comprise about 4 to 12% by weight of the microemulsion fuel. The free fatty acids comprise about 2 to 6% by weight of the microemulsion.

(c) A non-ethoxylated non-ionic surfactant. The specific surfactant, which is a novel part of this invention, is 2,4,7,9 tetramethyl-5-decyne-4,7 diol, manufactured by Air Products and Chemicals, Inc. under the trade name of Surfynol 104. When this surfactant is dissolved in 2-ethylhexanol-1 as a 50% solution by weight it is called Surfynol 104A. The surfactant and the solvent comprise about 1 to 2% each by weight of the microemulsion. This surfactant is also called "Acetylenic Diol Surfactant" which name will be used in the examples.

(d) Long chain water-insoluble or slightly soluble in water aliphatic alcohols with melting points below 0° C., for example, octanol-1, comprising 2 to 8% by weight of the microemulsion.

(e) The sodium salts of the fatty acids to stoichiometrically neutralize the sulfur acids generated from the oxidation of sulfur in diesel oil or fuel oil during combustion with the amount of the sodium salts comprising about 0.2 to 0.5% by weight of the microemulsion fuel. The amount of sodium salts required is dependent on both the sulfur content of the diesel oil and fuel oil and also, the percentage of diesel oil or fuel oil used in the microemulsion fuel.

(f) Water-soluble aliphatic alcohols such as methanol and ethanol comprising about 5 to 14% of the microemulsion fuel.

(g) Total water in the microemulsion comprising about 1 to 10% of the microemulsion fuel.

(h) Urea NOx scavenger comprising about 0.1 to 4.0% by weight of the microemulsion fuel.

(i) Ethyl carbamate NOx scavenger comprising about 0.1 to 4.0% by weight of the microemulsion fuel.

The first step in the preparation of the water-in-oil microemulsion fuel is to prepare the solution of additives. In preparing this solution there is no particular order of adding the components except that the aqueous ammonia is added last. However, there is one exception to this. For solutions containing ethyl carbamate, the aqueous ammonia is added before the ethyl carbamate to assure that none of the ethyl carbamate will hydrolyze.

The second step is the mixing of the solution of additives with the petroleum product such as diesel oil. One of the advantages of the microemulsions of this invention is that only very low shear mixing is necessary to prepare the water-in-oil microemulsion fuels.

DETAILED DESCRIPTION OF THE INVENTION

This invention relates to low viscosity, stable (W/O) microemulsions prepared by mixing petroleum products such as diesel oil and fuel oil with a solution of additives. The microemulsions are crystal clear at room temperature but like diesel oil and heating fuel oil, they become hazy at sub-freezing temperatures but with the important characteristics that there is not any phase separation and that they have good fluidity like diesel oil itself.

The solution of additives is a clear, low viscosity and stable molecular solution. It is prepared separately and can be stored separately until ready to use when preparing the microemulsions fuel.

The microemulsion is readily prepared by mixing the petroleum product with the solution of additives at room temperature. On a large scale the microemulsion can be prepared by feeding the solution of additives and the petroleum product from the respective storage tanks through separate pipe lines into a common pipe line that leads to a storage tank for the microemulsion fuel. The flow rates are monitored to deliver the preferred blend of the solution of additives with the petroleum product. For example, a preferred blend of v/v 65/35 diesel oil/additive solution is continuously prepared in which the flow rate of the diesel oil is 1.857 times the flow rate of the solution of additives for the same pipe diameter. The flow rates are readily maintained because of the low viscosities and easy transport of both the solution of additives and the diesel oil.

THE FUNDAMENTAL COMPONENTS OF THIS INVENTION

The solution of additives comprise six fundamental components described below.

1. An anionic surfactant prepared by the neutralization of 60 to 70% of the unsaturated fatty acids with ammonia such that there results both the ammonium salts of the fatty acids which represent the anionic surfactant and free fatty acids.

2. A non-ethoxylated non-ionic surfactant, the acetylenic diol surfactant, 2,4,7,9-tetramethyl-5-decyne-4,7-diol dissolved in 2-ethylhexanol-1.

3. Long chain, water-insoluble aliphatic alcohols with melting points below 0° C. such as octanol-1.

4. Water-soluble aliphatic alcohols such as methanol and ethanol.

5. Water.

6. NOx scavengers urea and ethyl carbamate..

Item 1

Unsaturated fatty acids derived from vegetable oils such as soybean oil which consist of oleic acid, linoleic acid and linolenic acid which comprise at least 90% of the fatty acids are used. Present in the unsaturated fatty acids are minor

a.36?